UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2002/00856

July 28, 2003

Mr. Lawrence C. Evans
U.S. Army Corps of Engineers
Regulatory Branch, CENWP-CO-GP
PO Box 2946
Portland, OR 97208-2946

Re: Reinitiation of Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Santiam Water Control District Canal Fish Screen and Tailrace Barrier Project, North Santiam River, Marion County, Oregon (Corps No. 200200720)

Dear Mr. Evans:

On March 3, 2003, NOAA's National Marine Fisheries Service (NOAA Fisheries) issued a biological opinion to the Corps of Engineers (COE) for permitting the installation of a fish screen and tail race barrier by the Santiam Water Control District (SWCD) in the North Santiam River, Marion County, Oregon. Subsequent to that opinion, it was determined that the site of the proposed tailrace barrier would not work due to flooding of adjacent property. Consequently, SWCD has altered the site of the barrier and the COE has requested reinitiation of consultation.

Enclosed is a revised biological opinion (Opinion) prepared by NOAA Fisheries pursuant to section 7 of the Endangered Species Act (ESA) on the effects of the revision to the proposed Santiam Water Control District Canal Fish Screen and Tailrace Barrier Project in Marion County, Oregon. The proposed project modifications and additional conservation measures are described in a June 25, 2003 revised biological assessment.

The enclosed Opinion is identical to that issued on March 3, 2003, except for changes necessary to reflect the proposed project modifications described above. Alterations made in the new Opinion include supplemental information describing the reinitiation process, changes in the proposed action and its effects, and changes to pertinent Reasonable and Prudent Measures. This Opinion supercedes the one dated March 3, 2003, which should be discarded. The revised Opinion will be posted on NOAA Fisheries' website.

In this Opinion, NOAA Fisheries concludes that the proposed action is not likely to jeopardize the continued existence of ESA-listed Upper Willamette River (UWR) chinook salmon

(*Oncorhynchus tshawytscha*) or UWR steelhead (*O. mykiss*). As required by section 7 of the ESA, NOAA Fisheries also includes reasonable and prudent measures with nondiscretionary terms and conditions that NOAA Fisheries believes are necessary to minimize the impact of incidental take associated with this action.
This document also serves as consultation on essential fish habitat pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations at 50 CFR Part 600.

If you have any questions regarding this consultation, please contact Anne Mullan of my staff in the Oregon Habitat Branch at 503.231.6267.

Sincerely,

For Michael R Course

D. Robert Lohn
Regional Administrator

cc: Larry Trosi, SWCD
Richard Craven, Craven Consulting Group
Jarvis Gust, USFWS
Doug DeHart, USFWS
Steve Mamoyac, ODFW

Revised
Endangered Species Act - Section 7 Consultation
Biological Opinion

&

Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Santiam Water Control District (SWCD) Canal Fish Screen and Tailrace Barrier Project,
North Santiam River, Marion County, Oregon
(Corps No. 200200720)

Agency:	U.S. Army Corps of Engineers
Consultation Conducted By:	NOAA's National Marine Fisheries Service, Northwest Region
Date Issued:	July 28, 2003
Issued by:	for Michael R Crouse D. Robert Lohn Regional Administrator
Refer to:	**2002/00856**

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1. INTRODUCTION

1.1 Background

On July 17, 2002, NOAA's National Marine Fisheries Service (NOAA Fisheries) received a request for Endangered Species Act (ESA) section 7 consultation from the U.S. Army Corps of Engineers (COE) for the Santiam Water Control District (SWCD) Canal Fish Screen and Tailrace Project near Stayton, in Marion County, Oregon. The biological assessment (BA) provided by the COE with the request for consultation determined that the proposed activities covered would be "likely to adversely affect" (LAA) anadromous fish species listed under the ESA. After numerous informational meetings and site visits, NOAA Fisheries issued a biological opinion for the project on March 3, 2003. Subsequent to the issuance of that opinion, SWCD determined that the site for placement of the proposed tailrace barrier would not work due to flooding of adjacent property. Consequently, SWCD has selected an alternative site for the barrier and the COE has requested reinitiation of consultation to evaluate potential impacts from placement of the barrier at the new site. SWCD has provided a revised BA dated June 25, 2003, a July 16, 2003 facsimile, a July 17 set of revised drawings, and a July 23, 2003 facsimile regarding side channel excavation and a July 23, 2003 fish salvage plan that address the proposed changes.

The objective of this biological opinion (Opinion) is to determine whether the proposed revised action is likely to jeopardize the continued existence of Upper Willamette River (UWR) chinook salmon (*Oncorhynchus tshawytscha*) or UWR steelhead (*O. mykiss*).

The Willamette River supports UWR chinook salmon and UWR steelhead. UWR chinook salmon were listed as threatened under the ESA by NOAA Fisheries on March 24, 1999 (64 FR 14308). Protective regulations for UWR chinook salmon were issued under section 4(d) of the ESA on July 10, 2000 (65 FR 42422). UWR steelhead were listed as threatened under the ESA by NOAA Fisheries on March 25, 1999 (64 FR 14517). Protective regulations for UWR steelhead were issued under section 4(d) of the ESA on July 10, 2000 (65 FR 42422).

The SWCD canal is part of a complex series of hydromodification projects in the vicinity of the western end of Geren/Stayton Island (Figure 1). The North Santiam River flows around the north side of the island (north channel) and the southern side of the island (south channel). The City of Salem has its municipal water facilities on Geren Island, and its intake extends into the north channel. Upper Bennett Dam maintains flow into the north channel, while Lower Bennett Dam diverts water into the SWCD's canal. Additional water is taken from the north channel through the Salem Ditch, owned by the City of Salem. The Salem Ditch provides water to the upper reaches of Mill Creek, then flows through the City of Salem to the Willamette River. The SWCD headgate and spill dam regulate water to the canal which, when properly maintained, has the capacity to convey up to 1100 cubic feet per second (cfs), for multiple uses (Table 1).

SWCD has operated the canal for nearly 140 years. Canal construction started in 1866, and the canal has been deepened several times (Lau 2001, cited in BA). The canal provides water for

multiple uses, including power production, irrigation, aesthetics, and municipal water supply. About 0.3 miles below the headgates, 70 cfs is diverted to a private canal to feed the unlicensed Rousch Hydroelectric Project (Rousch Hydro), protected by a rotary drum fish screen that is not in compliance with NOAA Fisheries' juvenile criteria. The discharge side of the Rousch Hydro facility is covered by a bar rack immediately downstream of the facility to prevent upstream passage. Water passing through Rousch Hydro rejoins the main power canal several hundred feet downstream, just below the Stayton and Water Street hydroelectric projects.

The Water Street Hydroelectric Project (Water Street Hydro) diverts between 125 and 185 cfs through a fixed screen with a traveling brush cleaning system constructed in 1985, and modified numerous times. This screen also does not meet NOAA Fisheries' juvenile criteria.

The Stayton Hydroelectric Project (Stayton Hydro) is adjacent to Water Street Hydro, and is designed to take 762 cfs for power production. Stayton Hydro became operational in the 1920's, and was owned by PacifiCorp (formerly Pacific Power and Light) until it was purchased by the SWCD in 1993, when operation of the plant ceased. As presently configured, Stayton Hydro has no fish screen and water enters by passing through a vertical bar rack with 3-inch spacing. A labyrinth weir regulates flow through the two hydro facilities and allows spill of excess water. Fish can pass upstream of the Stayton and Water Street projects by using a pool and weir fish ladder with submerged orifices located adjacent to the labyrinth weir.

PacifiCorp initiated First Stage Consultation with FERC in 1990. NOAA Fisheries and the Oregon Department of Fish and Wildlife (ODFW) recommended an instream flow evaluation in the project vicinity using the instream flow incremental method (IFIM) method, a water quality study in the same area, and a fish passage evaluation. PacifiCorp expressed concern that these studies would result in significant costs that could make the project uneconomic. By letter dated February 16, 1993, PacifiCorp requested that FERC resolve the need for the studies specified by ODFW and NOAA Fisheries. By letter dated May 13, 1993, FERC determined that the IFIM study was necessary, that the water quality study must include both temperature and dissolved oxygen measurements, and that a fish passage evaluation was not needed, since the fish passage issues were the responsibility of the SWCD, who owns the other facilities. The need for these studies and likely capital investments resulting from the studies prompted PacifiCorp to sell the project to the SWCD in 1993.

The SWCD initiated licensing proceedings with FERC for Stayton Hydro in April 1995, with the release of a First Stage Consultation Document (FSD) and a subsequent addendum to the FSD in May 1995. The SWCD hosted an initial consultation meeting with the agencies in May 1995, and received comments on the document from NOAA Fisheries in June 1995, which identified numerous sections of the document that required further detail to comply with the FERC consultation handbook requirements for a First Stage Consultation Package. Specifically, the document did not provide adequate detail on the affected environment, streamflow and water regime information, and proposed studies and study methods. The SWCD did not continue with the licensing process, and Stayton Hydro has not operated since it was shut down in 1993. The proposed juvenile fish screen and tailrace velocity barrier discussed in this Opinion were

designed to accommodate the full diversion capacity of the SWCD canal (approximately 1050 cfs), including the existing diversions and hydropower facilities, as well as the presently inactive Stayton Hydro water right of 762 cfs.

Figure 1. North Santiam River Diversions in the Vicinity of Stayton. See Table 1 for key to existing diversions.

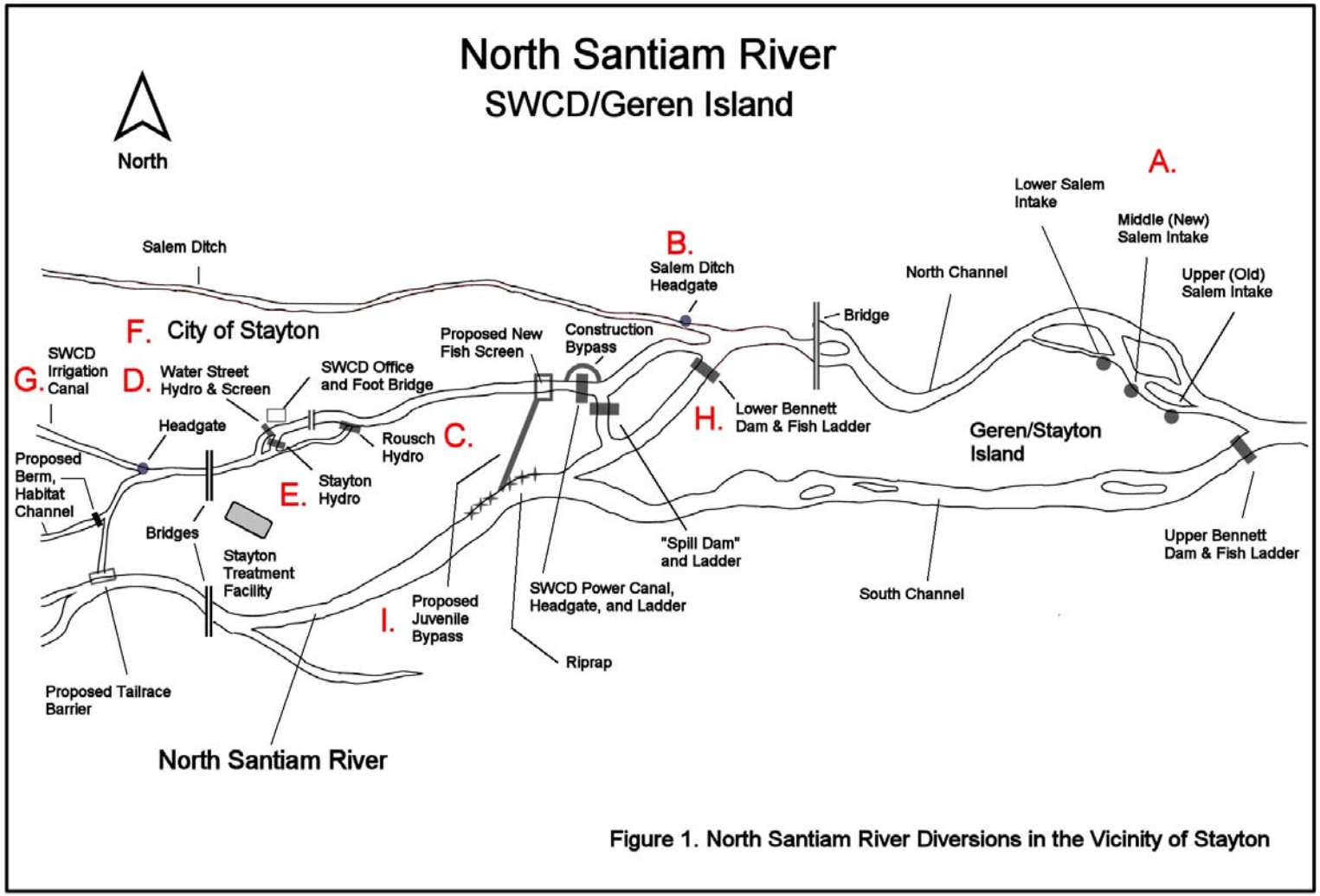

Figure 1. North Santiam River Diversions in the Vicinity of Stayton

Table 1. Existing Diversions and Water Rights for Projects and Facilities in the SWCD Canal Vicinity[d].

	Current Range of Flows (cfs) for a typical year	Water rights (cfs)	Project or Use	Consumptive?
A	75-116[a]	227	Salem municipal water	yes
B	60-80[a]	134.8	Salem Ditch to Mill Creek	yes (Santiam)
C	70[a]	70	Rousch Hydroelectric Project	no
D	125-185[a]	185	Water Street Hydroelectric Project	no
E	-	762	Stayton Hydro Hydroelectric Project	no
F	3-12[b]	22-46.59	City of Stayton Municipal supply (the 46.59 cfs is available October-March only)	yes
G	70-188[b]	216	SWCD Irrigation Canal	yes
H	50-70[c]	50	Lower Bennett Dam fish ladder & boat ramp	no
I	15-30[c]		Proposed juvenile fish bypass	no
	398-563 cfs	703.8 cfs	**Total flows diverted to the north channel** (The unlicensed Stayton Hydro 762 cfs are not included in the total. Also not included are the irrigation canal flows of 70 -220, since these can be provided by the nonconsumptive 255 cfs for Water St and Rousch hydro projects)	

a. R. Craven, personal communication with A. Mullan, NOAA Fisheries, email 11/15/02
b. estimates from L. Trosi, SWCD, personal communication to A. Mullan, NOAA Fisheries, email 11/29/02
c. estimates of required flows for operational facilities
d. Water rights values include data from the 6/2003 BA.

1.2 Proposed Action

Over the past ten years, numerous alternative configurations for passage have been considered for use within the SWCD canal system. Many options considered placing separate screens and ladders, if necessary, at the individual diversions or power plants to maintain the canal as a migration corridor for juvenile and adult salmonids. On May 23, 2000, the SWCD issued a "Concept Paper" that outlined various alternatives for passage through their project. NOAA Fisheries responded via letter, dated December 11, 2000, that supported Alternative 1. Alternative 1 proposed placement of an adult tailrace barrier at the downstream end of the tailrace, and a single, large screen and juvenile bypass system immediately downstream of the SWCD headgate. This configuration will exclude all fish from the SWCD canal and tailrace.

The proposed action was determined after analyzing the feasability, effectiveness, and impacts of these alternatives. The proposed modifications include the following: (1) Installation of a new fish screen, with a juvenile bypass return pipe that meets NOAA Fisheries' fry criteria (NMFS 1995) immediately downstream of the SWCD headgates; (2) creation of a temporary canal bypass to dewater the location of the new screen during construction; (3) installation of a tailrace velocity barrier at the end of the existing tailrace about 300' above the confluence with the North Santiam River fish; and, (4) an earthern berm on the south side of the tailrace canal to prevent flooding of agricultural land. Most of the construction will take place during the in-water work window, with the exception of the temporary canal bypass construction.

1.2.1 Fish Screen

The new fish screen support structure will be built with a concrete floor and walls, immediately downstream of the headgate structure. The concrete walls will connect to the existing headgate dam and will continue within the channel for 450 feet. At the end of the concrete walls, rip-rap will be placed on channel bed and slopes to help prevent erosion. A trash rack and working platform will be constructed near the mouth of the fish screen, and a 5-foot-wide walkway will be constructed along the perimeter of the fish screen. The fish screen will be a "V"-shaped design, approximately 250 feet long and 40 feet wide at the upstream end, narrowing to approximately 3 feet at the outlet. The vertical panels will consist of perforated plate with 3/32 inch openings and 33% open area, meeting NOAA Fisheries' criteria for fry. The screen will be outfitted with an automatic wiper screen-cleaning device. The design capacity of the new fish screen is 1050 cfs, which would accommodate the full capacity of the canal if the SWCD exercised their full water right and operated Stayton Hydro.

1.2.2 Temporary Canal Bypass

Prior to construction of the fish screen, a temporary canal bypass will be created to allow water to flow past the fish screen construction area, so the area can remain dewatered throughout the construction period. To minimize excavation and project impacts, the SWCD proposes to incorporate an old bypass channel into their 700-foot bypass channel, the majority of which will be excavated adjacent to the existing canal. The temporary bypass will begin 225 feet east (upstream) of the headgate dam in order to use a previous bypass channel created to construct the existing headgate structure. Presently, a dike isolates the old bypass channel at the upstream end from river flow, and a small backwater has formed at the downstream opening as water backs up the canal into the old bypass channel. To re-open and lengthen the bypass channel, a 16-foot-wide by 16-foot-long by 4-foot-high concrete box culvert will be installed in the dike to regulate flow into the bypass channel. The existing downstream connection will be initially blocked to isolate the construction area and to allow for further excavation of the bypass channel north of, and parallel to, the existing canal for approximately 550 feet. Depth of excavation of the remainder of the channel will vary with local topography, and to allow a drop in elevation from the intake to the outflow when it reconnects with the existing canal. After excavation, the bypass channel will have 1:1.5 bank slopes. The total length of the proposed bypass channel will be

approximately 700 feet. Approximately 2,500 cubic yards of material will be excavated during its construction. At the leading edge of the culvert, stop logs in an I-beam structure will be used to regulate flows, with a notch at one side for fish passage during construction.

1.2.3 Juvenile Fish Bypass Return Pipe

Fish that enter the new screen area will be guided into a transition box at the downstream end of the screens. They will then return to the North Santiam River via a 28-inch-diameter fish bypass pipeline that will connect to the distal end of the fish screen. The pipe will be buried for 600 feet from the transition box, until daylighting at the river bank where it empties into the north channel of the North Santiam River. The bank at the location of the outfall is nearly vertical, and the outfall pipe will protrude into the channel for approximately 10 feet. The approximate vertical distance from the outfall pipe to the channel will be one foot. The bypass pipe will require flows of 30 cfs, which will be returned to the Santiam River at the outfall. The channel bed below the outfall will be lined with rip-rap. Concrete will cap the rip-rap, extending downstream to the area of the expected hydraulic jump.

1.2.4 New Tailrace and Velocity Barrier

A component of the proposed Alternative 1 (screening the entire canal migration corridor) was to construct an adult tailrace barrier to prevent adult fish from migrating up the SWCD canal. Presently, adult fish enter the tailrace and experience delay within the canal as they locate and navigate the ladder at the labyrinth weir and headgate, or until they turn around and exit the canal at the downstream end. When Stayton Hydro was operational, adult fish experienced injury as they attempted passage through the turbines. Thus, the SWCD proposes to install a tailrace barrier to prevent adult fish from entering the canal.

The earlier proposed constructed tailrace location is not feasible due to site elevations and flooding of adjacent properties (March 17, 2003 Memorandum from Clifton Deal PE to Larry Trosi SWCD). Therefore, SWCD is now proposing to utilize the existing tailrace and construct a tailrace barrier, approximately 300 feet upstream of the confluence of the existing tailrace canal and the North Santiam River (about 2,700 yards downstream of the earlier proposed tailrace and barrier).

A tailrace barrier is necessary to prevent fish, especially upstream migrating salmon and steelhead from entering the tailrace. It would be constructed approximately 300 feet upstream of the confluence of the tailrace canal with the North Santiam River. The following summarizes the tailrace barrier characteristics:

- The tailrace barrier would be a reinforced concrete weir-type structure with a 3.5-feet high weir, key walls, footings, and 20-feet wide velocity apron. The weir and velocity apron would be 120-feet wide. The barrier was designed in accordance with the NOAA Fisheries design for velocity type barriers. The north end of the barrier would be “keyed

in" to the north bank of the tailrace canal. On the south bank the tailrace barrier will connect to a new earth berm.

- The footprint of the barrier would be 120-feet wide at the weir and approximately 160 feet wide from edge of key wall to edge of key wall. The weir elevation would be 422.0 and the velocity apron would be 418.5.
- A waterman-type control gate to dewater the weir under maintenance situations. This control gate would be located on the barrier structure near the north end.
- An earth berm, approximately 7.5 feet high at the tailrace barrier tapering to approximately 6-feet high near the Norpac Bridge, is necessary on the south side of the lower 900 feet of the tailrace (approximately from the Norpac Bridge to the tailrace barrier). The berm footprint will be up to 44 feet wide tapering to 10 feet wide at the top. The berm will be reinforced with 500 cubic yards of riprap on the lower 100 feet to minimize erosion.

Flows in the tailrace canal below the diversion where flows are diverted to the Main Canal will be terminated during construction. Approximately 3,300 feet of tailrace canal will be dewatered. Irrigation flows (up to 216 cfs) will be diverted into the Main Canal during irrigation season (March 1 through October 31). During non-irrigation season, approximately 70 cfs of flow will be diverted for the Fery Hydropower Project.

A temporary berm will be needed at the bottom end of the tailrace canal during construction of the tailrace barrier to block North Santiam River water from the construction area.

1.2.5 Fish Habitat Channel in the Existing Tailrace

The original proposal indicated that available flows from the canal would be routed to the abandoned tailrace after consumptive uses to provide rearing habitat for juvenile salmonids and other fish. This area was expected to provide low velocity refugia to offset the loss of rearing habitat in the canal, which had higher than optimal flows for juveniles. The presence of the fish screen and tailrace barrier will eliminate the use of the canal system by fish resources.

1.2.6 Construction Sequence and Fish Salvage

The areas and sequence of activities, some of which require dewatering and salvage during construction are as follows:

1. The existing backwater channel connection to the SWCD canal will be blocked by a berm and a temporary construction bypass channel will be excavated adjacent to the canal, connecting to the canal approximately 500 feet downstream of the headgate. Salvage in the approximately 25- by 100-foot existing backwater area will be conducted by seining any fish that remain after draining the backwater area.

2. A temporary berm will be constructed downstream of the headgate and fish screen construction area. Canal flows will be reduced for about 8 hours, and then the headgate

will be closed. After the temporary berm is constructed, the temporary bypass will be connected to the river and the canal. Salvage between the temporary construction berm and the SWCD canal headgate will be necessary. Pumping in the confined area where scour holes have formed before fish salvage may be required, although much of the water will removed during the reduced flows.

3. A temporary berm will constructed downstream of the irrigation canal intake to construct the new tailrace barrier and earthen berm. A dam of ecology blocks will be constructed in the tailrace (just downstream of the irrigation headgate) to divert the canal flow into the irrigation canal. A temporary earthen berm will also be placed near the confluence of the existing tailrace and the North Santiam River to prevent water from backing up into the tailrace and allow for barrier construction. Salvage between the ecology block berm at the headgate and the temporary construction berm will be necessary.

4. A small amount (approximately 75 cubic yards) of sand and gravel will need to be removed from a 150' by 20' area at the mouth of the side channel of the North Santiam River to ensure that flows continue past the dewatered tailrace canal to provide fish passage for any adults that migrate up the side channel. The material would be removed in the dry by a track hoe.

5. When the fish screen, juvenile bypass, and tailrace barrier are completely constructed, the temporary bypass will be blocked. Then, the SWCD canal will be drained partially to remove the construction berms. Any remaining fish in the canal will leave via the irrigation canal, which is still diverting flows for irrigation in September, or over the new tailrace as flows are directed there when the irrigation canal is only delivering 70 cfs to Fery Hydro.

2. ENDANGERED SPECIES ACT

2.1 Biological Opinion

2.1.1 Biological Information

UWR winter steelhead and spring chinook salmon migrate through, spawn, and rear in the North Santiam. Spring chinook estimates at Upper Bennett Dam during 1999-2001 ranged from weekly peaks of over 1000 in 2001, to a peak of approximately 500 spawners in 1999. Winter steelhead estimates at Upper Bennett Dam during 1999-2001 ranged from weekly peaks of approximately 800 in 2001, to 400 in 2000 (Craven 2002 UBD). Details specific to each of the two evolutionarily significant units (ESU) follow.

<u>UWR chinook salmon</u>
The UWR chinook salmon ESU includes native spring-run populations above Willamette Falls and in the Clackamas River. In the past, it included sizable numbers of spawning salmon in the

Santiam River, the middle fork of the Willamette River, and the McKenzie River, as well as smaller numbers in the Molalla River, Calapooia River, and Albiqua Creek.

The total run sizes reported for UWR spring chinook since 1970 have ranged from 30,000 to 130,000, with the 2000-2002 runs in the range of 60,000 to 80,000. In 2002, fishery counts showed a rate of 77 % for marked fish through June. Hence, approximately 23% of the 2002 forecasted run size of 74,000 results in approximately 17,000 natural spawners in the Willamette basin (ODFW 2002). Marking of hatchery releases with an adipose fin clip reached 100%, beginning with those released in 1998 (S. King, ODFW, personal communication with A. Mullan, NOAA Fisheries, 28 October 2002, email).

Fish in this ESU are distinct from those of adjacent ESUs in life history and marine distribution. The life history of chinook salmon in the UWR ESU includes traits from both ocean- and stream-type development strategies. Coded wire tag (CWT) recoveries indicate that the fish travel to the marine waters off British Columbia and Alaska. More Willamette fish are recovered in Alaskan waters than fish from the Lower Columbia River ESU. UWR chinook salmon mature in their fourth or fifth years. Historically, 5-year-old fish dominated the spawning migration runs, but recently, most fish have matured at age 4. The timing of the spawning migration is limited by Willamette Falls. High flows in the spring allow access to the upper Willamette basin, whereas low flows in the summer and autumn prevent later-migrating fish from ascending the falls. The low flows may serve as an isolating mechanism, separating this ESU from others nearby.

Human activities have had vast effects on the salmonid populations in the Willamette River drainage. First, the Willamette River, once a highly braided river system, has been dramatically simplified through channelization, dredging, and other activities that have reduced rearing habitat by as much as 75%. In addition, the construction of 37 dams in the basin has blocked access to over 700 kilometers (km) of stream and river spawning habitat. The dams also alter the temperature regime of the Willamette and its tributaries, affecting the timing and development of naturally-spawned eggs and fry. Water quality is also affected by development and other economic activities. Agricultural and urban land uses on the valley floor, as well as timber harvesting in the Cascade and Coast ranges, contribute to increased erosion and sediment load in Willamette River Basin streams and rivers. Finally, since at least the 1920s, the lower Willamette River has suffered municipal and industrial pollution.

Hatchery production in the basin began in the late nineteenth century. Eggs were transported throughout the basin, resulting in current populations that are relatively homogeneous genetically, although still distinct from those of surrounding ESUs. Hatchery production continues in the Willamette River, with an average of 8.4 million smolts and fingerlings released each year into the main river or its tributaries between 1975 and 1994. Hatcheries are currently responsible for most production (90% of escapement) in the basin.

Harvest on this ESU is high, both in the ocean and in river. The total in-river harvest below the falls from 1991 through 1995 averaged 33%, and was much higher before then. Ocean harvest

was estimated as between 19-33% since 1982. ODFW (1998a) indicates that total (marine and freshwater) harvest rates on UWR spring-run stocks were reduced considerably for the 1991-1993 brood years, to an average of 21%. Prior to full marking of hatchery fish with an adipose fin clip, harvest occurred on both wild and hatchery fish. Current regulations allow only marked fish to be retained (E&S Environmental Chemistry 2002).

For the UWR chinook salmon ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 1.01 to 0.63, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000).

Spring chinook salmon are native to the Santiam River subbasin. Wallis (1963) estimated a minimum run size of 8,250 adults in 1934 based on egg-taking at a hatchery rack near the confluence of the Breitenbush and North Santiam rivers (now under Detroit reservoir). This estimate did not include fish that spawned downstream of the rack, such as in the lower mainstem North Santiam River and the Little North Santiam River. Mattson (1948) estimated that, in 1947, 2,015 fish spawned naturally in the areas that are now above Detroit and Big Cliff dams out of an estimated 2,830 in the North Santiam River subbasin as a whole. Parkhurst *et al.* (1950) estimated that habitat could accommodate at least 30,000 adults.

Based on a comparison of the proportion of marked hatchery adults at return versus release, ODFW (1995) concluded that less than 300 naturally-produced UWR chinook adults returned to the subbasin in 1994. The total number of redds for marked plus unmarked chinook salmon in the 27-mile reach from Stayton Dam to Minto, increased from 155 in 1998 to 323 in 2000, dropping slightly to 308 in 2001, and dropping to 251 in 2002 (Lindsay *et al.* 1998, 2000; Schroeder *et al.* 1999, 2001, 2002). Of 346 carcasses counted in 2002 between the Stayton Dam and Minto, 83 (24%) were classified as unclipped or naturally-produced spawners. In the 13 miles downstream from Stayton and above Greens Bridge, 6 redds were surveyed in 2002, and in this stretch, 23 carcasses were counted, 4 of which were not clipped (Schroeder 2002).

In some years, hundreds of UWR chinook salmon have been observed in the Little North Santiam River (801 in 1946, 273 in 1954, 236 in 1971, and 242 in 1991; Willis *et al.* 1995, BLMS 1998, USACE 2000), but counts dropped below 16 per year during 1992 through 1995 (Willis *et al.* 1995). The total number of redds in the Little North Santiam varied from 11 to 39 during 1998 through 2001 (Lindsay *et al.* 1998, 2000; Schroeder *et al.* 1999, 2001).

Because hatchery fish were not consistently marked prior to 1998, it was not possible to detect trends in the wild, or naturally-produced population. For wild spring chinook salmon still present in the North Santiam subbasin, implementation of an expanded, basin-wide hatchery marking program and an increasingly selective fishery are expected to result in an incremental increase in survival of 37%. ODFW has begun to determine the extent of remnant wild spring chinook salmon population in the North Santiam subbasin, through the collection of otoliths and scale samples from adults caught in the sport fishery, on the spawning grounds, and at the Minto facility (ODFW 1998). Beginning in 2001, ODFW also monitored the ratios of marked to

unmarked adult spring chinook salmon at Stayton, in the fishery, on the spawning grounds, and at the Minto facility.

While examination of the status of wild spring chinook continues, all hatchery spring chinook released in the North Santiam River are marked smolts. ODFW plans to maintain the practice of not stocking the Little North Santiam River, but the Willamette Basin Fish Management Plan (ODFW 1998) requires that, if wild spring chinook escapement (which has declined in recent years) does not improve, a "rehabilitation" program (stocking with marked hatchery smolts) be considered for one cycle.

UWR steelhead

The UWR steelhead ESU occupies the Willamette River and tributaries upstream of Willamette Falls, extending to and including the Calapooia River. These major river basins containing spawning and rearing habitat comprise more than 12,000 km^2 in Oregon. Rivers that contain naturally-spawning, winter-run steelhead include the Tualatin, Molalla, Santiam, Calapooia, Yamhill, Rickreall, Luckiamute, and Mary's Rivers. Early migrating winter and summer steelhead have been introduced into the upper Willamette basin, but those components are not part of the ESU. Native winter steelhead within this ESU have been declining since 1971, and have exhibited large fluctuations in abundance.

In general, native steelhead of the upper Willamette basin are late-migrating winter steelhead, entering freshwater primarily in March and April. This atypical run timing appears to be an adaptation for ascending Willamette Falls, which functions as an isolating mechanism for UWR steelhead. Reproductive isolation resulting from the falls may explain the genetic distinction between steelhead from the upper Willamette basin and those in the lower river. UWR late-migrating steelhead are ocean-maturing fish. Most return at age four, with a small proportion returning as 5-year-olds (Busby *et al.* 1996).

Willamette Falls (river kilometer 77) is a known migration barrier. Winter steelhead and spring chinook salmon historically occurred above the falls, whereas summer steelhead, fall chinook, and coho salmon did not. Detroit and Big Cliff Dams cut off 540 km of spawning and rearing habitat in the North Santiam River. In general, habitat in this ESU has become substantially simplified since the 1800s by removal of large woody debris to increase the river's navigability.

The main hatchery production of native (late-run) winter steelhead occurs in the North Fork Santiam River, where estimates of hatchery proportion in natural spawning areas range from 14% to 54% (Busby *et al.* 1996). More recent estimates of the percentage of naturally-spawning fish attributable to hatcheries in the late 1990s are 17% in the North Santiam, and 5-12% in the South Santiam (Chilcote 1997).

Historically, UWR steelhead spawning occurred throughout the upper mainstem North Santiam River, in all the major tributaries such as the Breitenbush and Little North Santiam Rivers, and in many smaller tributaries (BLMS 1998; Olsen *et al.* 1992; WNF DRD 1994, 1995, 1996, 1997). Steelhead also used most of the mainstem North Santiam River for spawning. Based on an

August 1940 survey, Parkhurst *et al.* (1950) stated that conditions in the mainstem Santiam River (the reach below the confluence of the North with the South Santiam) were not suitable for spawning by salmon or trout.

Thompson *et al.* (1966) estimated that the North Santiam subbasin supported a population of 3,500 UWR steelhead in the 1950s and 1960s, including adults trapped at Minto Dam. Currently, UWR steelhead spawn in the mainstem of the North Santiam River below Minto Dam and in tributaries such as the Little North Santiam River, Mad Creek, and Rock Creek. Tributaries to the upper Little North Santiam River such as Elkhorn Creek and Sinker Creek are also used extensively. Because spawning takes place primarily in May, it is separated in time from that of UWR chinook salmon which takes place primarily in September. Some spatial separation occurs as well because UWR steelhead typically spawn in smaller streams than UWR chinook salmon but there is considerable overlap in larger streams, such as the mainstem North Santiam and the Little North Santiam River.

Prior to dam construction, some steelhead reached the upper stretches of the Santiam system as early the last of March and as late as the first of May. Spawning usually took place between April and the first of June (Dimick and Merryfield 1945). ODFW currently uses February 15th to discriminate nonnative (Big Creek Hatchery) from native winter steelhead at Willamette Falls (Kostow 1995). Spawning takes place from April through the first of June, indicating little change from historical conditions.

A winter-run hatchery stock, developed primarily from North Santiam wild fish but with some fish from the Big Creek and Klaskanine River stocks, was released into the Santiam subbasin beginning in 1952. ODFW (1990) releases approximately 100,000 steelhead smolts each year, mostly into the mainstem North Santiam River and Big Cliff Reservoir. Traps installed at Stayton in the North Santiam River in 1993 and 1994 caught 42% and 85%, respectively, marked winter steelhead (Kostow 1995). Hatchery strays from outside the system represented 2% of the catch in both years; the remainder were North Santiam stock hatchery fish. Beginning with releases in 1990, 100% were marked. Steelhead smolt releases stopped after 1998, with the three-year-old spawners returning in 2001 (W. Hunt, ODFW, personal communication with A. Mullan, NOAA Fisheries, 28 October 2002 email).

For the UWR steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 0.94 to 0.87, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000).

2.1.2 Evaluating Proposed Actions

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402 (the consultation regulations). NOAA Fisheries must determine whether the action is likely to jeopardize the listed species. In conducting analyses of habitat-altering actions under section 7 of the ESA, NOAA Fisheries uses the following steps: (1) Considering the

status and biological requirements of the species; (2) evaluating the relevance of the environmental baseline in the action area to the species' current status; (3) determining the effects of the proposed or continuing action on the species; (4) considering cumulative effects; and (5) determining whether the proposed action, in light of the above factors, is likely to appreciably reduce the likelihood of species survival in the wild. In completing this step of the analysis, NOAA Fisheries determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the continued existence of the listed species. If NOAA Fisheries finds that the action is likely to jeopardize the listed species, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

2.1.2.1 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying the ESA section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. NOAA Fisheries also considers the current status of the listed species, taking into account population size, trends, distribution and genetic diversity. To assess to the current status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list the species for ESA protection and also considers new data available that is relevant to the determination.

The relevant biological requirements are those necessary for the subject species to survive and recover to a naturally-reproducing population level, at which time protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance its capacity to adapt to various environmental conditions, and allow it to become self-sustaining in the natural environment.

Essential elements for salmonids are: Substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food (juvenile only), riparian vegetation, space, and safe passage conditions. Based on migratory and other life history timing, it is likely that adult and juvenile life stages are present in the action area when activities would be carried out. Actions authorized by the proposed project may affect water quality, water quantity, water temperature, water velocity, and cover/shelter.

According to the watershed assessment for the North Santiam, the subbasin has produced approximately 60% of wild steelhead in the upper Willamette Basin (E&S Environmental Chemistry 2002). The North Santiam was also described as providing habitat to approximately 40-50% of the winter steelhead, and 20-25% of the spring chinook in the Willamette system (L. Trosi, SWCD, personal correspondence, transcript of comments to funding committee). Spawning and rearing occur in the river reaches downstream, although most are upstream of the action area.

In their 2000 Salmon Basinwide Recovery Strategy, the Federal Caucus (2000) identified the North Santiam as one of three priority subbasins in which to focus immediate attention for UWR

chinook and UWR steelhead, because productive capacity could be significantly increased if problems related to water diversion were addressed. Actions suggested included protecting productive habitat and fixing flow, passage and diversion problems by restoring flows to depleted streams, screening and combining water diversions, and reducing passage obstructions.

For this consultation, the biological requirements are improved habitat characteristics that function to support successful rearing and migration. The current status of the indicated fish species, based upon their risk of extinction, has not significantly improved since the species were listed.

2.1.2.2 Environmental Baseline

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species or its habitat and ecosystem within the action area. Direct effects occur at the project site and may extend upstream or downstream based on the potential for impairing fish passage, hydraulics, sediment and pollutant discharge, and the extent of riparian habitat modifications. Indirect effects may occur throughout the watershed where actions described in this Opinion lead to additional activities or affect ecological functions, contributing to habitat degradation. For this consultation, the action area is defined by NOAA Fisheries regulations (50 CFR 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." Because multiple dams and channels in the vicinity of Stayton (Figure 1) direct the water into the area where the proposed screen will be placed, the action area extends beyond the immediate proposed structures. The action area begins upstream at the site of Upper Bennett Dam on the eastern end of Stayton Island, where the river is splits into both the north and south channel, and extends in both channels downstream into the North Santiam to the extent of canal diversion effects on river flow levels.

The COE's Big Cliff and Detroit Dams upstream on the North Santiam block passage to 38 miles of habitat and passage to tributaries. The Minto Fish Weir, located two miles below Big Cliff Dam also restricts upstream passage. Downstream from the Big Cliff Dam, the North Santiam has 47 miles of potential fish habitat. At the Minto facility, ODFW sorts marked hatchery fish from wild fish, and returns some of the hatchery fish to sites downstream for the recreational fisheries. Unmarked fish are returned to the river, either immediately above the weir, or in some cases into the Little North Santiam, the largest tributary below the COE dams. Chinook fry are released into Detroit Reservoir where they contribute to the sport fishery (Hunt 1999). It is unknown whether this population contributes to runs below the dams.

Prior to construction of Detroit and Big Cliff Dams, peak flows in the North Santiam greater than 40,000 cfs were not uncommon. Since completion of the existing COE flood control projects, unregulated inflows from tributaries such as the Little North Santiam River continue to produce flood events comparable to all but the largest pre-dam flows. Flows as high as 67,200 cfs have been recorded at the Mehama gage, but the two-year recurrence interval event has decreased from approximately 34,200 cfs to 19,700 cfs. Since construction of Detroit and Big Cliff Dams,

no flows lower than 682 cfs have been recorded at the Mehama gage, and the average daily flow in August has increased to 1,310 cfs (Moffatt *et al.* 1990). Some post-project summer flows are greater than occurred historically, because storage is available at COE facilities to redistribute flood volumes and release water later in the year for flow augmentation purposes.

At Upper Bennett Dam, the river is diverted into the north channel. The remaining flows travel over the dam and ladder into the south channel (Figure 1). Upper Bennett Dam operations ensure sufficient flows in the north channel to meet diversions for the City of Salem Geren Island intakes, the Salem Ditch, over the Lower Bennett Dam, and finally in the SWCD power canal. Lower Bennett Dam diverts part of the north channel flows into the SWCD canal while flows over the dam and ladder remain in the north channel, joining the south channel a short distance downstream. Flows in the unscreened Salem Ditch are diverted to the City of Salem, through Mill Creek, and finally to the Willamette.

Downstream from the Lower Bennett Dam, the Spill Dam and fish ladder in the north channel are sited upstream of the existing power canal headgate and ladder. Juveniles migrating downstream, as well as steelhead kelts (repeat spawners) in the north channel can travel over Lower Bennett Dam, or over the Spill Dam to return to the river. Alternatively, juveniles outmigrating in the canal currently must pass the other hydropower, municipal, and irrigation facilities. Downstream from the City of Stayton, the SWCD irrigation canal headgate marks another diversion of flows, between those for the irrigation consumptive uses and the remaining flows into the current tailrace, proposed as a habitat channel. Outmigrants are susceptible to entrainment into the irrigation canal currently. Current flows through the tailrace were not provided, but these provide passage to the river, about 1.5 miles below the entrance to the SWCD power canal. Estimates of current diversions are shown in Table 1.

Adults migrating upstream via the south channel ascend the Upper Bennett Dam ladder. They can also ascend either the Spill Dam ladder or the Lower Bennett Dam ladder to enter the north channel. Currently the Spill Dam ladder provides better passage for salmonids than the Lower Bennett Dam route, which at low flows has an exposed concrete apron that can inflict harm on the fish attempting to move across the barrier. This is proposed for replacement by the City of Salem currently. Alternatively they can migrate through the tailrace, into the canal, over the ladders, and finally into the north channel.

Under existing operations, the total diversions routed into the north channel and the canal could strand fish in the south channel in low flow years. An ODFW (1994) evaluation of passage at the Stayton complex used the Oregon Method to evaluate conditions in both the north and south channels. The study objective was to determine a relationship between river discharge and suitable depths and velocities to achieve adult passage conditions. The authors analyzed data from three transects to correlate discharge with percent-passable conditions, assuming a minimum depth of 0.8 feet, and maximum velocity criteria of 8.0 feet per second for adult chinook. For the south channel to meet these criteria in 25% of the stream width, the mean discharge required is 470 cfs; to meet the criteria in 10% of the stream width, the mean discharge required is 375 cfs.

Of the current diversions listed in Table 1, those required to flow into the north channel total 463 cfs (sum of top of range for rows A to D plus F), with highest diversions from June through September, and maximum in August. Flows are available for the irrigation canal consumptive use after the power canal nonconsumptive hydropower use. Additional flows return to the river over Lower Bennett Dam, or over the Spill Dam, and flows remaining past the irrigation canal return through the tailrace. Total summer consumptive diversions remove approximately 396 cfs (sum of top of range for rows A, B, F, and G in Table 1) in typical current years. The south channel is nearly dewatered in low flow years (E&S Environmental Chemistry 2002), particularly when flows into the north channel exceed the maximum required to meet diversions. In addition to the 463 cfs above, 100 cfs is needed in the north channel to maintain passage through the Lower Bennett Dam fish ladder and the proposed juvenile bypass (sum of top of range for rows H and I in Table 1). Hence, the total diverted from the south channel will approach 563 cfs.

The lowest recently recorded monthly average flows at the Mehama U.S. Geological Survey (USGS) gage upstream were 757 cfs in July and 699 cfs in August 1992, with only six other years averaging below 1000 cfs in August since 1954 when upstream COE dams modified flows (Table 3). In low flow years, those with less than 1000 cfs at the Mehama gage, removal of 563 from the south channel results in less than 25% stream width meeting the passage criteria, and in extreme low flow years such as 1992, not even 10% of the stream width will meet passage criteria (ODFW 1994).

For the combined diversions, monthly average flows since 1954 (post-regulated flows) show that the 25% stream width flows were not met for 21% of years in August , 6% in July, and 4% in June and September (Table 2). Under these circumstances, the loss of passage through the canal is problematic when low flows coincide with the peak return weeks. During the peaks for June through August 1999-2001, 500 to 1100 spring chinook passed Upper Bennett Dam (shown in the BA, Appendix C, Fish Trap Counts). If more than 563 cfs were diverted for existing use under low water year conditions, the potential for take under section 9(a)(1) of the ESA could increase dramatically.

The North Santiam River is 303d-listed for temperature in both time periods checked by Oregon Department of Environmental Quality (ODEQ 2002). Their data showed that 39% of summer values exceeded the temperature standard (17.8°C), with exceedences annually and a maximum of 22°C in water years 1986-1995. For the spawning season criteria of 12.8°C, 12 days in the period September 1999-June 2000 had temperatures exceeding the criteria (ODEQ 2002). In draft guidance for temperature water quality standards, the EPA listed adult migration lethal temperatures as 21-22°C for 1 week constant exposure, with elevated disease at constant temperatures 14-17°C, and an overall reduction in migration fitness due to cumulative stresses found at temperatures greater than 17-18°C for prolonged exposures (EPA 2002). Spawning and egg incubation temperatures were much lower with constant 4-12°C necessary for good survival.

Table 2. USGS, Water Resources Data, North Santiam River Monthly Streamflow Statistics at Mehama

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
1954	5983	4983	2778	3812	3065	3729	1713	1226	2309	3279	4279	3145
1955	3425	2356	2977	4574	3279	5521	2318	1170	1785	5090	8281	11110
1956	11430	2254	3431	4732	5429	3575	1651	1319	1974	3484	4846	6545
1957	2298	2945	5530	3602	3273	1694	1137	918	1777	2864	3123	6479
1958	7523	6541	1985	4470	2350	2153	1500	1067	1661	2439	8956	5455
1959	6308	3579	2412	3061	3951	2325	1177	1001	2800	5109	4353	2648
1960	1865	3454	3921	5714	5897	2480	1254	1245	1732	2314	7140	6327
1961	3895	9197	5659	2722	3846	2303	1344	1283	1625	3101	4618	6727
1962	4311	2027	2811	4755	4503	2151	1303	1314	1669	4077	6161	6408
1963	1875	3728	2203	4224	4177	1554	1481	1330	1633	2650	7003	3498
1964	5074	2887	2338	2383	4111	4081	1697	1369	1711	2255	4199	13150
1965	10040	6095	1584	1865	2501	1459	1036	1125	1761	2209	4053	2353
1966	5665	1931	3295	4177	3532	1361	1110	1039	1485	2342	6193	5528
1967	5673	3461	2153	1819	2389	1884	1273	1245	1526	3426	5063	4108
1968	4695	5429	3093	2072	1925	1671	1130	1833	2334	5044	8349	6787
1969	6392	2360	2576	2567	5324	3501	1595	1742	2175	2471	3095	4450
1970	7289	7821	2403	2363	3177	1661	1288	1494	1910	2393	5225	5311
1971	7732	4743	4273	4125	5427	4063	1633	1676	2325	3163	5699	8032
1972	7056	6487	10890	4153	5470	3169	1528	1590	2372	1970	3385	6151
1973	5348	1555	1918	1624	1136	1023	1085	1108	1739	2579	9857	10430
1974	10330	4587	4705	4863	4662	5218	1950	1603	2248	2559	2995	6328
1975	8801	3925	3738	2442	4180	2333	1707	1625	1849	3639	6024	9516
1976	7963	2945	2735	3386	4225	2240	1826	1770	2006	2139	2502	1183
1977	1212	1048	1950	1661	2359	1945	1182	1462	2254	2888	7191	14299
1978	6489	2720	1579	1806	2067	1534	1032	1142	2562	2247	2918	5661
1979	2116	4230	4511	3837	4091	1359	1121	1101	1933	2843	3297	4431
1980	7017	2227	2172	2922	1932	1903	1189	1307	2270	1949	3573	7556
1981	3483	3230	1607	2532	2577	4170	1292	1329	2314	2970	4009	10200
1982	5325	8921	3876	3061	3528	2468	1398	1281	2300	3462	5154	8071
1983	7960	5789	4907	3483	3448	2319	2528	1335	2708	2655	5899	6218
1984	5596	3921	4730	3186	5260	5029	1610	1147	2660	3340	9002	3958
1985	1877	2103	2047	3227	3562	3423	1234	1159	2400	3667	5822	3025
1986	5340	7485	4986	1849	2601	1461	1128	1027	1985	2478	6523	4292
1987	3288	3815	2821	1820	1445	1153	1017	990	1588	1796	1904	5521
1988	4483	2838	2537	4191	3799	2836	1190	1063	1654	2264	6434	4127
1989	4852	3282	3565	4068	2748	1899	1141	1149	1973	2312	3547	2873
1990	5913	3078	2797	4248	3105	3250	1235	1032	1701	3256	5568	4182
1991	4261	2972	2882	2708	3561	1874	1214	996	1701	2483	5566	5782
1992	2617	2723	1467	2105	1511	956	757	699	996	2419	5034	4495
1993	2338	1796	5792	6128	4783	3383	1514	1168	1910	2824	1545	2937
1994	4596	2173	2186	2223	1752	1883	1072	980	1318	3030	6029	6559
1995	5568	8225	3156	2526	3383	1953	1181	994	1875	3802	7935	11130
1996	7573	12360	2587	4621	4299	1782	1245	1123	1700	4196	7844	11480
1997	11070	6254	4769	4474	3668	2270	1567	1161	2280	4742	5074	3246
1998	7607	2442	2994	2127	3631	2385	1283	1046	1810	3066	5904	8799
1999	9068	4016	4049	3127	5603	4401	2058	1376	2314	2519	5759	8849
2000	4408	4478	3159	3434	4007	2973	1233	1054	1912	2717	3015	2684
2001	1795	1558	1807	2960	3605	1771	1152	930	916			

Percent years with flows < 25% width passage in south channel	**4**	**6**	**21**	**4**

2.1.3 Analysis of Effects

2.1.3.1 Effects of Proposed Action

The proposed new fish screen is sited downstream from the Lower Bennett Dam and fish ladder, in the SWCD power canal, below the existing headgate and ladder (Figure 1). Juveniles traveling through the power canal headgate will be diverted through the proposed juvenile bypass integral to the screen. The bypass pipe will be placed so that fish exit below the confluence of the two channels. When non-consumptive hydropower flows are not directed into the irrigation canal, they can be routed through the proposed tailrace barrier to return them to the river.

2.1.3.1.1 Reduced Entrainment Effects

In the existing operations, the SWCD canal system attracts both adult and juvenile fish, providing passage both upstream and downstream particularly when flows are higher than in the river. Injury and mortality are likely to occur due to inadequate screens at the Water Street hydropower plant. With the proposed tailrace velocity barrier in place, upstream passage from the North Santiam will be blocked and migration delay reduced. However, the irrigation canal with outlets to the Mill Creek remains as possible passage upstream. With the proposed power canal screen, downstream kelt and juvenile passage will be blocked.

2.1.3.1.2 Migration Corridor Loss Effects

Since spring chinook and winter steelhead spawn and rear in the area, fish presence is possible all year long. Migration for spring chinook can extend from April through October, and for winter steelhead from March through May. As the tailrace barrier and screen are completed, the limited habitat values within the canal will be lost. This primarily affects the fish when the flows are reduced in the river as diverted water enters the canal. Reduced flows from the operation of the canal and Upper and Lower Bennett dams will maintain temperatures at current problem levels, without the option of passage through flows previously provided in the canal. The tradeoff is the benefit of removing the suboptimal passage provided in the canal, given the unscreened diversions and the channelized nature of the canal, with large variations in flow. Because the canal primarily provided migration habitat, loss after installation of the fish screen and tailrace barrier will be offset by increased survival of juvenile and adult migrating fish that avoid entrainment in the canal.

2.1.3.1.3 Temporary Bypass Channel Excavation Effects

To incorporate an old adjacent bypass channel into the temporary 700-foot bypass channel, 2,500 cubic yards of material will be excavated and vegetation will be removed. After excavation, the 35-foot-wide bypass channel will have 1:1.5 bank slopes. Excavated material will be placed in an upland area. Upon wetland delineation, the restoration and mitigation will

be completed. Four wetland areas will be avoided for construction. Other vegetation present in the area includes: black cottonwood (*Populus balsamifera*), Douglas-fir (*Pseudotsuga* menziesii), willows (*Salix* sp.), Queen Anne's lace (*Daucus carota*), and orchard grass (*Dactylis glomerata*), with individual hydrophytic plants such as red alder (*Alnus rubra*), red-osier dogwood (*Cornus stolonifera*), willow, soft rush (*Juncus effusus*), and reed canarygrass (*Phalaris arundinacea*) near the water level.

To mitigate for the construction vegetation removal and migration habitat loss, the abandoned section of tailrace will be enhanced to improve off-channel rearing habitat for juvenile salmonids. A plan for riparian plantings and placement of large wood will be prepared. Increased turbidity of water flowing through the temporary bypass channel and returning to the river via the existing tailrace may occur during construction.

2.1.3.1.4 New Tailrace and Velocity Barrier Effects

In the current configuration, adult fish enter the tailrace and the power canal and experience delay. To reduce this harm, the new tailrace will have a velocity barrier composed of a concrete barrier with a 120-foot-wide weir spillway, with a design capacity of 950 cfs. Rip-rap will be installed downstream of the apron to reduce channel migration away from the barrier, and will be capped with concrete. Potential riparian habitat lost from the concrete barrier and rip-rap will be offset by the reduced attraction of upstream migrants to the canal. Additionally, the construction of the new tailrace barrier to supply a backwater effect will assist in delivering the flows into the irrigation canal, somewhat minimizing the flows diverted at Upper and Lower Bennett Dams to the SWCD power canal so as to provide sufficient head at the irrigation canal diversion.

The use of the existing tailrace barrier will also preclude the original concept of providing some refugia for juvenile fish and the return of water sooner to the North Santiam River. Flows in the North Santiam River are problematic in the project area. The use of the existing tailrace canal will not improve flows beyond that described above.

The percentage of the total flow of the North Santiam River that travels down the side channel to where it joins the tailrace canal and through the fish attraction channel is unknown. The attractant flow from the tailrace barrier may be sufficient to attract fish to the tailrace barrier and flows in the side channel may be insufficient to attract them back to the North Santiam River. Monitoring of the tailrace barrier flows and side channel flows will be necessary and adaptive management implemented if (through monitoring) it is shown that side channel flows and/or tailrace attraction are problematic.

2.1.3.1.5 Fish Rescue, Salvage and Relocation

As a result of the proposed action, salvage activities at the temporary bypass and headgate construction areas would require potential direct handling of listed salmonids during fish removal. After discussions with ODFW biologists (S. Mamoyac and W. Hunt, personal communication with A. Mullan, NOAA Fisheries, phone conversation January 20, 2003) regarding the presence of salmonids in the project area, NOAA Fisheries determined that the

potential exists to capture and relocate up to 700 steelhead or chinook salmon during work area isolation and fish rescue and salvage efforts above the irrigation diversion. Fish salvage from the irrigation diversion to the new tailrace barrier could potentially capture and relocate an additional unknown, but potentially large amount (conceivably up to or over 5,000).

Up to a 5% direct or delayed mortality rate from capture and relocation stress could occur during fish salvage and removal. For the area above the irrigation diversion, this could amount to 35 individuals. For the area below the irrigation diversion, this could amount to over 250 juveniles.

A detailed plan on how to salvage juvenile salmonids from the 3,000 feet of dewatered area necessary to build the tailrace barrier has not been finalized. Such a plan would facilitate salvage operations and minimize potential mortality.

The small amount of material to be removed at the mouth of the North Santiam River side channel will allow for fish passage during construction. The removal is required because the current low flows in the North Santiam River have resulted in the side channel becoming isolated from the river. The only flows currently in the side channel are from the tailrace canal. Cessation of flows resulting from construction of the tailrace barrier would necessitate salvage efforts in an additional one-mile stretch of river. This could result in substantial take of fish. Since the material removal would be mostly done in the dry, temporary turbidity increases are not expected.

2.1.3.2 Interrelated and Interdependent Effects

If Stayton Hydro resumes operation based on use of the additional water right of 762 cfs, as the screen size allows, flows in the south channel and mainstem of the North Santiam River will dramatically decrease. This is significant because the fish passage facilities described in this opinion will only function if adequate instream flows are maintained in the bypass reach. NOAA Fisheries agreed to consultation on the effects of the proposed facilities before evaluating effects of resumed hydro operations because: (1) Operation of the Stayton Hydro facility will require FERC consultation, including an IFIM study to determine appropriate instream flows while operating Stayton Hydro; (2) The SWCD has offered assurances that they will not make any irreversible and irretrievable commitment of resources with respect to usage of the water for either the Stayton Hydro facility or other use until FERC (or the Corps if it is a non-hydro usage) and NOAA Fisheries complete consultation on that usage; and (3) the screen, tailrace barrier, and bypass improve passage at high flows without increased diversions, a high priority under the Basinwide Recovery Strategy. Any increases in diversions will require analysis and information on necessary flows for rearing habitat.[1]

[1] The ODFW (1994) passage evaluation provided information only about flows needed for passage, and did not address habitat needs for other life history stages. (R. Kruger, ODFW, personal communication with A. Mullan, NOAA Fisheries, 13 November 2002 email).

2.1.3.3 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as those effects of "future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes. Therefore, these actions are not considered cumulative to the proposed action.

NOAA Fisheries expects that the currently unused water rights could allow additional diversion demands, some of which are consumptive. The likelihood of reduced flows in the river will grow with any additional consumptive use and will adversely affect migration and rearing in the north and south channels. This could result in an increased percentage of years with flows less than that required for 25% channel width available for passage.

The screen is sized to allow full flow of the additional 762 cfs right available to the SWCD (Table 1, row E). As stated in the July 16, 2002 Addendum to the Biological Assessment, "[I]t is the intent of the SWCD to make maximum use of the water right for hydropower, irrigation, or other purposes consistent with beneficial use of water." The Certificate of Water Right for this water right states that it may be used for "power and other manufacturing purposes" (State Record 1962). The timing of such additional diversions could further reduce flows through the south channel and in the river below the confluence of the channels until returned at the tailrace. When diversions coincide with low flows in the river, the potential for dewatering the river between Upper Bennett Dam and the tailrace barrier increases. Maintaining diversions in the SWCD power canal at actual use levels will minimize the overall effect of loss of habitat due to screening.

Consumptive uses such as irrigation will further reduce flows downstream of the project. For the consumptive uses diverted from the canal (Table 1), if the full water right of 220 cfs were to be used by the irrigation canal, the habitat channel would have only 22 cfs. If Stayton municipal were to divert 22 cfs rather than 12 cfs, there would be 12 cfs remaining for the habitat channel.

Note the amounts used in the baseline above did not include use of the full water rights for the Salem consumptive municipal water or diversions via Salem Ditch to Mill Creek (which flows into the Willamette River). Any additional diversions would remove flows from the North Santiam River and, particularly when coinciding with spring chinook or winter steelhead migrations, will potentially increase take of adults or rearing juveniles beyond levels authorized by this opinion.

2.1.4 Conclusion

NOAA Fisheries has determined, based on the available information, that the proposed action covered in this Opinion is not likely to jeopardize the continued existence of listed salmonids. NOAA Fisheries used the best available scientific and commercial data to apply its jeopardy

analysis, analyzing the effects of the proposed action on the biological requirements of the species relative to the environmental baseline, together with cumulative effects.

Our conclusions are based on the following considerations: (1) Most of the proposed work to dewater the construction area will occur during the in-water work window of July 15 through August 31, which NOAA Fisheries expects to minimize the likelihood of UWR steelhead presence in the action area due to peak upstream migration having occurred earlier; (2) any increases in sedimentation and turbidity to the reaches of the North Santiam River will be short-term and minimized by best management practices including work area isolation and site restoration with plantings; (3) the new screen and bypass will meet NOAA Fisheries criteria, thus reducing incidental take; (4) any hydro project or further increase in diversions will require a separate section 7 consultation; (5) better flow management and voluntary conservation may have some marginal instream flow benefits; (6) the improved passage contributes to one of the immediate action needs under the Basinwide Recovery Strategy; and (7) the proposed action is not likely to impair properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat toward proper functioning condition essential to the long-term survival and recovery at the population or ESU scale. Overall, NOAA Fisheries expects long-term beneficial effects of improved fish passage as a result of screening the areas with inadequate passage.

2.1.5 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitat, or to develop additional information. NOAA Fisheries believes the following conservation recommendations are consistent with these obligations, and therefore should be carried out by the COE:

1. Produce a water management plan which addresses flows required for passage, rearing, and spawning for the Upper and Lower Bennett dams and SWCD diversion system.

2. Include a plan of operation for the Big Cliff and Detroit dams to provide sufficient flows under low flow conditions during spring chinook migration, so that the south channel will have 25% width available for passage, determined to be 470 cfs in the ODFW passage evaluation report (ODFW 1994), or as determined in future IFIM studies.

3. Modify the unscreened diversions on the Salem Ditch and at the downstream outlets of the SWCD irrigation canal into Mill Creek, Marion Creek and/or McKinney Creek with screens meeting NOAA Fisheries' criteria[2] by the applicant to prevent take.

[2] National Marine Fisheries Service, *Juvenile Fish Screen Criteria* (revised February 16, 1995) and *Addendum: Juvenile Fish Screen Criteria for Pump Intakes* (May 9, 1996) (guidelines and criteria for migrant fish passage facilities, and new pump intakes and existing inadequate pump intake screens)

4. For NOAA Fisheries to be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed salmon and steelhead or their habitats, we request notification of the achievement of any conservation recommendations when the COE submits its annual report describing achievements of the fish monitoring program during the previous year.

2.1.6 Reinitiation of Consultation

This concludes formal consultation on these actions in accordance with 50 CFR 402.14(b)(1). Reinitiation of consultation is required: (1) If the amount or extent of incidental take is exceeded; (2) if the action is modified in a way that causes an effect on the listed species that was not previously considered in the biological assessment and this biological opinion; (3) if new information or project monitoring reveals effects of the action that may affect the listed species in a way not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16). Reinitiation of the consultation will also be required if a licensing application is submitted to FERC to operate the Stayton Hydro, or if SWCD chooses to increase diversions for a new "manufacturing purpose."

If the applicant fails to provide specified monitoring information by the required date, NOAA Fisheries will consider that a modification of the action that causes an effect on listed species not previously considered, and causes the Incidental Take Statement of this Opinion to expire.

2.2 Incidental Take Statement

Section 9 and rules promulgated under section 4(d) of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, and sheltering. "Harass" is defined as actions that create the likelihood of injuring listed species by annoying it to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the impact of any incidental taking of threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

(http://www.nwr.noaa.gov/1hydrop/hydroweb/ferc.htm).

2.2.1 Amount or Extent of the Take

NOAA Fisheries anticipates that the actions covered by this Opinion are reasonably certain to result in incidental take of ESA-listed salmonids because of potential adverse effects from reduced passage available at low flows, increased sediment levels, chemical contamination, temperature increases, and the potential for direct incidental take during in-water work. Handling of juvenile steelhead or chinook salmon during the work isolation process may result in incidental take of individuals if juvenile salmonids are present during the construction period. NOAA Fisheries anticipates non-lethal incidental take of up to 5,700 individuals, of which, lethal take of 285 fry or juvenile steelhead or chinook salmon could occur as a result of the fish rescue, salvage and relocation activities covered by this Opinion. The potential adverse effects of the other project components on population levels are largely unquantifiable and NOAA Fisheries does not expect them to be measurable in the long term. The extent of authorized take is limited to UWR steelhead or UWR chinook salmon in the SWCD canal, temporary bypass and tailrace barrier construction area and is limited to that caused by the proposed action within the action area.

2.2.2 Reasonable and Prudent Measures

NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to avoid or minimize take of listed salmonid species resulting from the action covered by this Opinion. The COE shall include measures that will:

1. Avoid or minimize the likelihood of incidental take associated with general construction of the fish screen and tailrace barrier, including mitigation for vegetation loss caused by excavation for temporary bypass canal and loss of habitats in the abandoned tailrace, by ensuring fish passage around the project during construction and avoiding or minimize disturbance to riparian and aquatic systems.

2. Avoid or minimize the likelihood of incidental take associated with fish screen and tailrace barrier operation by ensuring that the facilities allow upstream and downstream movement of adult and juvenile fish around the project.

3. Ensure completion of a comprehensive monitoring and reporting program to confirm this Opinion is meeting its objective of minimizing take from permitted activities.

2.2.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the COE and/or their contractors must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. To implement reasonable and prudent measure #1 (general construction of the fish screen and tailrace barrier), the COE shall ensure that:

a. Timing of in-water work. Work below ordinary high water will be completed during the preferred in-water work period of July 15-August 31, except for the temporary bypass channel, fish bypass outfall, and construction and removal of isolation structures described above in section 2.1. Any other work below ordinary high water outside of the approved work period must be approved in writing by NOAA Fisheries.

b. Cessation of work. Project operations will cease under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.

c. Fish passage. Passage will be provided for any adult or juvenile salmon or steelhead present in the project area during construction, and after construction for the life of the project at the bypass outfall reach and the vicinity of the tailrace velocity barrier.

d. Fish screens. All water intakes used for a project, including pumps used to isolate an in-water work area, will have a fish screen installed, operated and maintained according to NOAA Fisheries' fish screen criteria.[3]

e. Pollution and Erosion Control Plan. A pollution and erosion control plan will be prepared and carried out to prevent pollution related to construction operations. The plan must be available for inspection on request by COE or NOAA Fisheries.

    i. Plan Contents. The pollution and erosion control plan must contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.

        (1) Practices to prevent erosion and sedimentation associated with access roads, stream crossings, construction sites, borrow pit operations, haul roads, equipment and material storage sites, fueling operations and staging areas.

        (2) Practices to confine, remove and dispose of excess concrete, cement and other mortars or bonding agents, including measures for washout facilities.

        (3) A description of any hazardous products or materials that will be used for the project, including procedures for inventory, storage, handling, and monitoring.

        (4) A spill containment and control plan with notification procedures, specific clean up and disposal instructions for different products, quick response containment and clean up measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

        (5) Practices to prevent construction debris from dropping into any stream or water body, and to remove any material that does drop with a minimum disturbance to the streambed and water quality.

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[3] National Marine Fisheries Service, *Juvenile Fish Screen Criteria* (revised February 16, 1995) and *Addendum: Juvenile Fish Screen Criteria for Pump Intakes* (May 9, 1996) (guidelines and criteria for migrant fish passage facilities, and new pump intakes and existing inadequate pump intake screens) (http://www.nwr.noaa.gov/1hydrop/hydroweb/ferc.htm).

ii. Inspection of erosion controls. During construction, all erosion controls must be inspected daily during the rainy season and weekly during the dry season to ensure they are working adequately.[4]

(1) If inspection shows that the erosion controls are ineffective, work crews must be mobilized immediately to make repairs, install replacements, or install additional controls as necessary.

(2) Sediment must be removed from erosion controls once it has reached 1/3 of the exposed height of the control.

f. Construction discharge water. All discharge water created by construction (*e.g.*, concrete washout, pumping for work area isolation, vehicle wash water) will be treated as follows.

i. Water quality. Facilities must be designed, built and maintained to collect and treat all construction discharge water using the best available technology applicable to site conditions. The treatment must remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present.

ii. Discharge velocity. If construction discharge water is released using an outfall or diffuser port, velocities must not exceed 4 feet per second.

iii. Spawning areas. No construction discharge water may be released within 300 feet upstream of active spawning areas.

g. Preconstruction activity. Before significant [5] alteration of the project area, the following actions must be completed:

i. Marking. Flag the boundaries of clearing limits associated with site access and construction to prevent ground disturbance of critical riparian vegetation, wetlands and other sensitive sites beyond the flagged boundary.

ii. Emergency erosion controls. Ensure that the following materials for emergency erosion control are onsite.

(1) A supply of sediment control materials (*e.g.*, silt fences, straw bales).

(2) An oil-absorbing floating boom whenever surface water is present.

iii. Temporary erosion controls. All temporary erosion controls must be in-place and appropriately installed downslope of project activity within the riparian area until site restoration is complete.

h. Temporary access roads.

i. Existing ways. Existing roadways or travel paths must be used whenever possible, unless construction of a new way would result in less habitat take.

ii. Steep slopes. Temporary roads built mid-slope or on slopes steeper than 30% are not authorized.

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[4] "Working adequately" means no turbidity plumes are evident during any part of the year.

[5] "Significant" means an effect can be meaningfully measured, detected or evaluated.

iii. Minimizing soil disturbance and compaction. When a new temporary road is necessary within 150 feet of a stream, water body or wetland, soil disturbance and compaction must be minimized by clearing vegetation to ground level and placing clean gravel over geotextile fabric, unless otherwise approved in writing by NOAA Fisheries.

iv. Temporary stream crossings.

(1) The number of temporary stream crossings must be minimized.

(2) Temporary road crossings must be designed as follows:

(a) A survey must identify and map any potential spawning habitat within 300 feet downstream of a proposed crossing.

(b) No stream crossing may occur at known or suspected spawning areas, or within 300 feet upstream of such areas if spawning areas may be affected.

(c) The crossing design must provide for foreseeable risks (*e.g.*, flooding and associated bedload and debris) to prevent the diversion of streamflow out of the channel and down the road if the crossing fails.

(d) Vehicles and machinery must cross riparian areas and streams at right angles to the main channel wherever possible.

v. Obliteration. When the project is completed, all temporary access roads must be obliterated, the soil must be stabilized, and the site must be revegetated. Temporary roads in wet or flooded areas must be abandoned and restored as necessary by the end of the in-water work period.

i. Heavy Equipment. Use of heavy equipment will be restricted as follows:

i. Choice of equipment. When heavy equipment must be used, the equipment selected must have the least adverse effects on the environment (*e.g.*, minimally-sized, rubber-tired).

ii. Vehicle staging. Vehicles must be fueled, operated, maintained and stored as follows:

(1) Vehicle staging, cleaning, maintenance, refueling, and fuel storage must take place in a vehicle staging area placed 150 feet or more from any stream, water body or wetland.

(2) All vehicles operated within 150 feet of any stream, water body or wetland must be inspected daily for fluid leaks before leaving the vehicle staging area. Any leaks detected must be repaired in the vehicle staging area before the vehicle resumes operation. Inspections must be documented in a record that is available for review on request by COE or NOAA Fisheries.

(3) All equipment operated instream must be cleaned before beginning operations below the bankfull elevation to remove all external oil, grease, dirt, and mud.

iii. Stationary power equipment. Stationary power equipment (*e.g.*, generators, cranes) operated within 150 feet of any stream, water body or

wetland must be diapered to prevent leaks, unless otherwise approved in writing by NOAA Fisheries.

j. Site preparation. Native materials will be conserved for site restoration.
   i. If possible, native materials must be left where they are found.
   ii. Materials that are moved, damaged or destroyed must be replaced with a functional equivalent during site restoration.
   iii. Any large wood [6], native vegetation, weed-free topsoil, and native channel material displaced by construction must be stockpiled for use during site restoration.

k. Isolation of in-water work area. If adult or juvenile fish are reasonably certain to be present, the work area will be well isolated from the active flowing stream using inflatable bags, sandbags, sheet pilings, or similar materials. The work area will also be isolated if in-water work may occur within 300 feet upstream of spawning habitats.

l. Capture and release. Before and intermittently during isolation and dewatering of the work areas, capture and release of fish from the isolated area using trapping, seining, electrofishing, or other methods as are prudent to minimize risk of injury shall be conducted. Prior to commencing construction, a detailed salvage plan shall be submitted to NOAA Fisheries for approval. In addition to the plan the following shall also apply:
   i. A fishery biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish must conduct or supervise the entire capture and release operation.
   ii. If electrofishing equipment is used to capture fish, the capture team must comply with NOAA Fisheries' electrofishing guidelines.[7]
   iii. The capture team must handle ESA-listed fish with extreme care, keeping fish in water to the maximum extent possible during seining and transfer procedures to prevent the added stress of out-of-water handling.
   iv. Captured fish must be released as near as possible to capture sites.
   v. ESA-listed fish may not be transferred to anyone except NOAA Fisheries personnel, unless otherwise approved in writing by NOAA Fisheries.
   vi. Other Federal, state, and local permits necessary to conduct the capture and release activity must be obtained.
   vii. NOAA Fisheries or its designated representative must be allowed to accompany the capture team during the capture and release activity, and must be allowed to inspect the team's capture and release records and facilities.

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[6] For purposes of this Opinion only, "large wood" means a tree, log, or rootwad big enough to dissipate stream energy associated with high flows, capture bedload, stabilize streambanks, influence channel characteristics, and otherwise support aquatic habitat function, given the slope and bankfull width of the stream in which the wood occurs. See, Oregon Department of Forestry and Oregon Department of Fish and Wildlife, *A Guide to Placing Large Wood in Streams*, May 1995 (www.odf.state.or.us/FP/RefLibrary/LargeWoodPlacemntGuide5-95.doc).

[7] National Marine Fisheries Service, *Backpack Electrofishing Guidelines* (December 1998) (http://www.nwr.noaa.gov/1salmon/salmesa/pubs/electrog.pdf).

viii. Post isolation and dewatering, an extensive survey of the isolated areas will be conducted to determine the success of capturing and relocating salmonids in the isolated areas. A summary of the results of that survey shall be submitted to NOAA fisheries within 30 days of the end of salvage operations.

m. Earthwork. Earthwork (including drilling, excavation, dredging, filling and compacting) will be completed as quickly as possible.

i. Site stabilization. All disturbed areas must be stabilized, including obliteration of temporary roads, within 12 hours of any break in work unless construction will resume work within 7 days between June 1 and September 30, or within 2 days between October 1 and May 31.

ii. Side channel gravel removal. The minimum amount of gravel necessary to allow flow of water down the dry side channel shall be removed.

iii. Source of materials. Boulders, rock, woody materials and other natural construction materials used for the project must be obtained outside the riparian area.

(1) Any erodible elements of this system must be adequately stabilized to prevent erosion.

(2) Surface water from the area must not be diverted from or increased to an existing wetland, stream or near-shore habitat sufficient to cause a significant adverse effect to wetland hydrology, soils or vegetation.

n. Site restoration. All streambanks, soils and vegetation disturbed by the project are cleaned up and restored as follows:

i. Restoration goal. The goal of site restoration is renewal of habitat access, water quality, production of habitat elements (such as large woody debris), channel conditions, flows, watershed conditions and other ecosystem processes that form and maintain productive fish habitats.

ii. Streambank shaping. Damaged streambanks must be restored to a natural slope, pattern and profile suitable for establishment of permanent woody vegetation.

iii. Revegetation. Areas requiring revegetation must be replanted before the first April 15 following construction with a diverse assemblage of species that are native to the project area or region, including grasses, forbs, shrubs and trees.

iv. Pesticides. No pesticide application is allowed, although mechanical or other methods may be used to control weeds and unwanted vegetation.

v. Fertilizer. No surface application of fertilizer may occur within 50 feet of any stream channel.

vi. Fencing. Fencing must be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

2. To implement reasonable and prudent measure #2 (fish screen and tailrace barrier operation), the COE will ensure that the applicant will design, install and operate the fish screen as follows:

a. Bypass entrance. Design the upstream entrance to the fish bypass entrance to allow real-time adjustments based on juvenile fish passage needs at different levels of instream flow.

b. Irrigation canal flow diversion berm. Design and operate the irrigation canal flow diversion berm to regulate water in the SWCD Irrigation Canal, thus reducing flow deficits in the North Santiam River.

c. Flow operations. When flash boards are in place at Upper Bennett Dam, the following flow conditions will be met.
   i. Instream flows will be provided in amounts necessary, and as determined by visual inspections described below, to ensure fully functional juvenile fish passage conditions past the new fish screen and juvenile bypass system.
   ii. Minimum instream flows of 50 cfs will be provided in the north channel below Lower Bennett Dam, with passage for adults through the fish ladder.

d. Minimal diversions, excluding the Stayton Hydroelectric Project. The SWCD will only divert water into the North Channel and SWCD Canal to the extent necessary to meet existing delivery obligations, specifically excluding any new or expanded diversion by the SWCD for operation of the Stayton Hydroelectric Project or a new manufacturing purpose.

e. Educational notice: status of ESA species in the North Santiam River and the need for water conservation. Provide written notification to every owner or occupant of property served by the works of the SWCD, and from which the SWCD collects any user charge, fee or toll for use of its works, of the following information as part of a special mailing, a feature article in a periodic newsletter, or such other manner that the SWCD deems appropriate.
   i. Adult and/or juvenile UWR chinook salmon and UWR steelhead are or may be present in the project area year round.
   ii. These species are listed as threatened under the Federal Endangered Species Act.
   iii. Adults and juveniles of these species should be avoided and protected, and require minimum instream flows to successfully complete behaviors such as migration, spawning and rearing that are necessary for their long-term survival and recovery.
   iv. The lack of necessary instream flows may result in a variety of adverse biological effects including direct mortality, delayed migration, reduced spawning, loss of preferred food resources for rearing, reduced growth, altered competitive relationships, reduced populations and decreased productivity.
   v. Therefore, all users served by the SWCD are encouraged to eliminate waste and be as efficient as possible in their use of water, including their technology or method of diverting, transporting, applying and recovering water; by changing management of water use; and by applying specific conservation measures such as eliminating system leakage, low water use landscaping, metering, and use of high efficiency plumbing fixtures.

f. Educational sign: status of ESA species in the North Santiam River and the need for water conservation. Post the same educational information outlined above on permanent signs placed and maintained in the vicinity of the fish screen and tailrace barrier, or as near those facilities as is appropriate, to notify members of the SWCD, contractors, or other members of the public who may be in the area.

3. To implement reasonable and prudent measure #3 (monitoring and reporting), the COE will ensure that the applicant completes the following tasks.

a. Construction monitoring. Ensure that the applicant submits a monitoring report to the Corps and to NOAA Fisheries within 120 days of project completion describing success meeting the construction terms and conditions for the fish screen and tailrace barrier. The construction monitoring report will include the following information:

i. Project identification
   (1) Permittee name, consultation number, and project name,
   (2) contact person for project construction, and
   (3) starting and ending dates for work completed

ii. Narrative assessment. A narrative assessment of the project's effects on natural stream function.

iii. Photo documentation. Photographs of habitat conditions at the project before, during, and after project completion.[8] Include general views and close-ups showing details of the project and project area, including pre and post construction. Label each photo with date, time, project name, photographer's name, and a comment about the subject.

iv. Work cessation. Dates work cessation was required due to high flows.

v. Fish screen. Compliance with NOAA Fisheries' fish screen criteria.

vi. Pollution and erosion control. A summary of pollution and erosion control inspections, including any erosion control failure, hazardous material spill, and correction effort.

vii. Site preparation. Total cleared area – riparian and upland.

viii. Isolation of in-water work area, capture and release.
   (1) Supervisory fish biologist – name and address.
   (2) Methods of work area isolation and take minimization.
   (3) Stream conditions before, during and within one week after completion of work area isolation.
   (4) Means of fish capture.
   (5) Number of fish captured by species.
   (6) Location and condition of all fish released.
   (7) Any incidence of observed injury or mortality.
   (8) Post dewatering survey results.

[8] Relevant habitat conditions may include characteristics of channels, eroding and stable streambanks in the project area, riparian vegetation, water quality, flows at base, bankfull and over-bankfull stages, and other visually discernable environmental conditions at the project area, and upstream and downstream of the project.

ix. Site restoration.
(1) Finished grade slopes and elevations.
(2) Log and rock structure elevations, orientation, and anchoring (if any).
(3) Planting composition and density.
(4) A five-year plan to:
(a) Inspect and, if necessary, replace failed plantings to achieve 100 percent survival at the end of the first year, and 80 percent survival or 80 percent coverage after five years (including both plantings and natural recruitment).
(b) Control invasive non-native vegetation.
(c) Protect plantings from wildlife damage and other harm.

b. Annual operations monitoring report. Ensure that the applicant submits an annual operations monitoring report to the Corps and to NOAA Fisheries by January 31 of each year until 2008 describing its success meeting the operations terms and conditions for the fish screen and tailrace barrier. The operations monitoring report will include the following information:

i. Flow measurement. Weekly minimum flow levels measured in cubic feet per second, between March 1 and October 31, at each of the following locations.
(1) Upper Bennett Dam
(2) Lower Bennett Dam
(3) Salem Ditch Headgate
(4) SWCD Power Canal Headgate
(5) SWCD Irrigation Canal Headgate
(6) Tailrace barrier
(7) For the North Santiam immediately upstream of the confluence with the tailrace canal and in the fish access channel connecting the tailrace canal and the North Santiam River, weekly minimum flow levels will be measured beginning July 1 through September 30 or if the flows at the Mehama gauge drop below 1500cfs in June it will commence then.

ii. Fish passage. Weekly visual confirmation that fish passage conditions are being met, between March 1 and October 31, at each of the following sites.
(1) Juvenile outfall – note whether fish are being successfully released into water outside the riprap zone, and the approximate numbers of any predators present.
(2) Tailrace barrier – note whether adults are attracted to the barrier during migration, or as a refuge from high flows in the North Santiam River.

iii. Site restoration.
(1) A summary of site restoration plant inspections, and replantings and non-native vegetation control efforts (if any).

iv. Educational efforts. Provide a copy of the written notification given to SWCD users regarding the status of ESA species in the North Santiam River and the need for water conservation, a description of how and when the notice was distributed, and photographs of signs showing the same information that were installed at the fish screen and tailrace barrier.

c. Reporting address. Submit a copy of the construction and annual operating reports to the following address:

Oregon Habitat Branch Chief - Portland
NOAA Fisheries
Attn: 2002/00856
525 NE Oregon Street
Portland, OR 97232

d. Reinitiation. The Corps shall reinitiate formal consultation on this Opinion if the SWCD increases diversions for a new or expanded diversion by the SWCD for operation of the Stayton Hydroelectric Project or a new manufacturing purpose. This term and condition is in addition to reinitiation requirements described in section 2.1.6 above.

e. Salvage notice. If a dead, injured, or sick endangered or threatened species specimen is located, initial notification must be made to the NOAA Fisheries Law Enforcement Office, located at Vancouver Field Office, 600 Maritime, Suite 130, Vancouver, Washington 98661; phone: 360.418.4246. Care will be taken in handling sick or injured specimens to ensure effective treatment and care or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered and threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

3. MAGNUSON-STEVENS ACT

3.1 Background

The objective of the essential fish habitat (EFH) consultation is to determine whether the proposed actions may adversely affect designated EFH for relevant species, and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the proposed action.

3.2 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires the inclusion of EFH

descriptions in Federal fishery management plans. In addition, the MSA requires Federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH.

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting the definition of essential fish habitat: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.110).

Section 305(b) of the MSA (16 U.S.C. 1855(b)) requires that:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH;
- NOAA Fisheries shall provide conservation recommendations for any Federal or state activity that may adversely affect EFH;
- Federal agencies shall within 30 days after receiving conservation recommendations from NOAA Fisheries provide a detailed response in writing to NOAA Fisheries regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NOAA Fisheries, the Federal agency shall explain its reasons for not following the recommendations.

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by Federal agencies undertaking, permitting or funding activities that may adversely affect EFH, regardless of its location.

3.3 Identification of EFH

The Pacific Fisheries Management Council (PFMC) has designated EFH for Federally-managed fisheries within the waters of Washington, Oregon, and California. Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years) (PFMC 1999).

Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the *Pacific Coast Salmon Plan* (PFMC 1999). Assessment of the potential adverse effects to these species' EFH from the proposed action is based on this information.

The Pacific Fisheries Management Council (PFMC) has designated EFH for three species of Pacific salmon: Chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the *Pacific Coast Salmon Plan* (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based on this information.

3.4 Proposed Action

The proposed action is detailed above in section 1.2. The action area for this consultation begins upstream at the site of Upper Bennett Dam on the western end of Stayton Island, where the river is diverted into the north channel, and extends in both channels downstream into the N. Santiam to the extent of canal diversion effects on river flow levels. This area has been designated as EFH for chinook and coho salmon.

3.5 Effects of Proposed Action

Chinook salmon spawn downstream of the Stayton complex in the North Santiam River, but due to the lack of spawning habitat, they primarily use it for rearing as juveniles. This project will improve rearing habitat in the existing tailrace, and reduce mortality from the passage through the SWCD canal. As described in detail in section 2.1.3.1 of this Opinion, the proposed action may result in adverse effects to water quality (sediment and temperature) and quantity. NOAA Fisheries believes the implementation of the fish screen and tailrace project is likely to adversely affect EFH for chinook and coho salmon. NOAA Fisheries also believes that providing fish passage and the conservation measures proposed as an integral part of the action would avoid, minimize, or otherwise offset potential adverse impacts to designated EFH.

3.6 Conclusion

NOAA Fisheries believes that implementation of the fish screen and tailrace project in the North Santiam River will adversely affect designated EFH for chinook and coho salmon.

3.7 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the Magnuson-Stevens Act, NOAA Fisheries is required to provide EFH conservation recommendations for any Federal or state agency action that would

adversely affect EFH. The conservation measures proposed for the project by the applicant, all of the reasonable and prudent measures and the terms and conditions contained in section 2.2.3 are applicable to chinook and coho salmon EFH. Therefore, NOAA Fisheries incorporates each of those measures here as EFH recommendations.

3.8 Statutory Response Requirement

Please note that the Magnuson-Stevens Act (section 305(b)) and 50 CFR 600.920(j) requires the Federal agency to provide a written response to NOAA Fisheries after receiving EFH conservation recommendations within 30 days of its receipt of this letter. This response must include a description of measures proposed by the agency to avoid, minimize, mitigate or offset the adverse impacts of the activity on EFH. If the response is inconsistent with a conservation recommendation from NOAA Fisheries, the agency must explain its reasons for not following the recommendation.

3.9 Supplemental Consultation

The COE must reinitiate EFH consultation with NOAA Fisheries if either the action is substantially revised or new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920).

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